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IS : 11014 (Part 3) - 1985

(Reaffirmed 2006)

Indian Standard

SPECIFICATION FOR PIEZOELECTRIC CERAMIC MATERIALS

PART 3 TYPES 4 AND 8

0. General — This standard (Part 3) shall be read in conjunction with IS : 11014 (Part 1)-1984 'Specification for piezoelectric ceramic materials : Part 1 General aspects and methods of measurements'.

1. Type Designation — *See* **3** of IS : 11014 (Part 1)-1984.

1.1 *Type 4* — Modified 'lead zirconate titanate' material having low loss factor (tan δ) and high-mechanical quality factor (Qm) along with other normal piezoelectric properties suitable for use in high signal applications.

1.2 *Type 8* — Modified 'lead zirconate titanate' material having lower dielectric loss factor (tan δ) as well as lower mechanical loss factor (high Q_m) compared to Type 4 and it has greater resistance to depolarization which makes it suitable for very high signal applications.

2. Test Specimens — In general practical dimensions used in ceramic elements may not be suitable for the measurement of many piezoelectric parameters. To determine these parameters accurately, the specimen should have size A, B or C depending upon the parameter to be measured, as given in Table 1.

TABLE 1 SPECIMEN SIZE REQUIRED FOR MEASUREMENT OF PIEZOELECTRIC PARAMETERS

Parameter to be Measured	Size of the Specimen*
T	
K_3	A, B or C
K_p	C
d_{33}	A
g_{33}	A
N_{3t}	B or C
Q_m	A, B or C

*Size A : $l \geqslant 2·5\ W, t$ or D where both ends are electroded.

Size B : $l \geqslant 3·5\ W, t$ where major faces are electroded.

Size C : $D \geqslant 10\ t$ where the surfaces are electroded.

where l=length, W=Width, t=thickness, and D=Diameter

Piezoelectric Devices for Frequency Control and Selection Sectional Committee, LTDC 12,
Panel for Piezoelectric Ceramic Materials and its Devices LTDC 12/P1 [Ref : Doc : LTDC 12 (820)]

Adopted 25 October 1985 © September 1986, ISI Gr 1

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3. Parameters — *See* Table 2 below :

TABLE 2 PARAMETERS WITH TOLERANCE FOR PIEZOELECTRIC CERAMIC MATERIALS TYPES 4 AND 8

Constant	Symbols	Piezoelectric Material		
		Type 4	Type 8	Tolerance
a) Density (*Min*) (10^3 kg/metre^3)	d	7·5	7·6	—
b) Dielectric constant	K_3^T	1 200	1 000	±20 percent
*c) Dissipation factor	$\tan\delta$	$\leqslant 0{\cdot}004$	$\leqslant 0{\cdot}004$	—
d) Resistivity (ohm.cm) at 25°C	ρ	10^{13}	10^{12}	—
e) Planner coupling coefficient	k_p	0·50	0·50	± 5 percent
f) Piezoelectric charge constant X10^{-12} C/N	d_{33}	280	220	±10 percent
g) Piezoelectric voltage constant X10^{-3} V-m/N	g_{33}	26	25	±10 percent
h) Frequency constant (meter — Hz)	N_{31}	2 000	2 050	±10 percent
j) Mechanical quality factor	Q_m	500	1 000	±10 percent
k) Curie temperature (°C) (*Min*)	θ_c	300	280	—

This is low signal voltage value measured at 1 kHz.

Printed at Delhi Printers, New Delhi, India